LOGANATHA NARAYANASAMY GOVT. COLLEGE (Autonomous), PONNERI – 601 204

APRIL 2021 SEMESTER EXAMINATIONS

IV SEMESTER – M.Sc., CHEMISTRY

Paper Code : **17PEM4J** Title of the Paper : **Instrumental Methods in Inorganic Chemistry**

DATE **: 05.05.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer any **TEN** Questions from the following

1. Mention any two carrier gases used in Gas chromatography.
2. What is the role of high pressure pump in Liquid chromatography?
3. a) Mention the selection rule for IR spectra.

   b) How many fundamental modes of vibration are obtained for H_2O?
4. State the Franck - Condon principle.
5. Sketch the ^{19}F - NMR spectra of BrF_5.
6. What is hyperfine splitting?
7. Define the term ‘g - value’.
8. Mention the various types of electronic transitions involved in UV - Visible spectroscopy.
9. What is recoil energy?
10. What is isomer shift?
11. Define the term R_f value in TLC?
12. What is meant by quadrupole splitting?

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. Explain the principle involved and the applications of TLC.
14. Enumerate the differences between IR and Raman spectroscopy.
15. Consider ^{31}P - NMR spectra of the scrambled products of the reaction between PCl_3 and PF_3 and mention the NMR parameter that helps in their unambiguous characterization.
16. Explain how ESR spectroscopy is useful in the study of magnetic behaviour of a transition metal ion?
17. Explain the applications of quadrupole interactions in Mossbauer spectroscopy.
18. IR spectroscopy and Raman spectroscopy are complimentary to each other- substantiate with suitable examples.
19. Explain the Mossbauer spectra of sodium nitroprusside.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. a) Explain the principle involved, procedure and the applications of HPLC. (6 Marks)

    b) Explain how HPLC is used for amino acid analysis by taking an example. (4 Marks)

21. a) Write a note on 'Mutual exclusion principle'. (5 Marks)

    b) How is IR spectroscopy useful in the determination of terminal and bridged carbonyls of metal carbonyls? (5 Marks)

22. a) The ^{31}P - NMR spectra of $HPO(OH)_2$ is a doublet and that of $H_2PO(OH)$ is a triplet - Account for. (4 Marks)

    b) Determine the structure of P_4S_3 using its ^{31}P - NMR spectra. (6 Marks)

23. a) Discuss the EPR spectra of Bis (salicylidiminato) copper (II) complex. (6 Marks)

    b) What are the factors affecting 'g value'? Explain. (4 Marks)

24. Draw and explain the Mossbauer spectra of the following compounds :

    a) $FeSO_4.7H_2O$ b) $K_3[Fe(CN)_6]$

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APRIL 2021 SEMESTER EXAMINATIONS

IV SEMESTER – M.Sc., CHEMISTRY

Paper Code : **17PEM4K** Title of the Paper : **Chemistry of Natural Products**

DATE **: 06.05.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

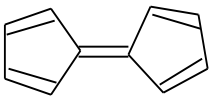
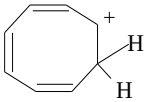
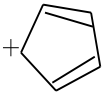
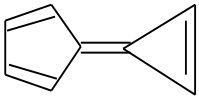
Answer any **TEN** Questions from the following

1. What are alkaloids? Give an example.
2. Write the structure of cocaine and morphine.
3. State isoprene rule.
4. Give any one characteristic test to identify the methoxy group of alkaloid.
5. List any two functions of anthocyanin.
6. Write the structure of flavonol and mention any two of its functions.
7. What are steroids? Mention any two of its functions.
8. How will you convert cholesterol into Diels' hydrocarbon?
9. What are the conditions for aromaticity?
10. What is meant by homoaromaticity? Give an example.
11. What happens when atropine is hydrolysed?
12. Draw the structure of azulene and predict whether it is aromatic or non - aromatic.

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. How are alkaloids isolated from plants? Explain.
14. Explain the classification of terpenoids based on isoprene rule.
15. Elucidate the structure of flavone with a method of synthesis.
16. Write the preparation of Progestrone.
17. Predict whether the following compounds are aromatic / non – aromatic / antiaromatic.

(i)  (ii)  (iii)  (iv)  (v) 

18. Explain the structural elucidation of cocaine.
19. Explain the constitution and functions of Bile acids.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. Explain the methods of structural elucidation of papaverine.
21. Discuss the general methods of determination of structure of camphene.
22. Explain the general methods of structural elucidation of phorphyrin.
23. Write any one method of preparation of the following compounds :
    (a) Cholesterol
    (b) Aldosterone.
24. Discuss the aromaticity of tropone, tropolone , [10] - & [14] - annulene with structure.

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APRIL 2021 SEMESTER EXAMINATIONS

IV SEMESTER – M.Sc., CHEMISTRY

Paper Code : **17PEM4L** Title of the Paper : **Chemistry of Macromolecules**

DATE **: 07.05.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer any **TEN** Questions from the following

1. What are plasticizers? Give two examples.
2. What are fillers? Give two examples.
3. Write the mechanism of cationic polymerization.
4. What are living polymers? Give an example.
5. Define the term 'glass transition temperature'.
6. What are copolymers? Give an example.
7. What is photo degradation?
8. What are stabilizers? Give an example.
9. Mention any two advanced techniques of polymerization.
10. What is meant by metathesis polymerization?
11. What are fire retardants? Give an example.
12. What do you mean by oxidative degradation of polymers?

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. Write a note on water soluble polymers.
14. Give the mechanism of free radical polymerization by taking an appropriate example.
15. Explain the various factors that affect glass transition temperature.
16. How is bio degradation of polymers carried out?
17. Write a note on group transfer polymerization.
18. How is molecular weight of a polymer determined by viscometry method?
19. Write a note on dendrimers.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. Explain the preparation and biological activity of the following compounds :

    (a) Polyacrylamide (b) Polyisothiocyanates.

21. Discuss in detail about the polymerization carried out in homogeneous and heterogeneous phases.

22. Explain the principle and the procedure involved in the determination of molecular weight of a polymer by.

(a) Gel permeation method (b) Ultra centrifuge method.

23. Write a note on the following :

(a) Thermal degradation of polymers (b) Ablation.

24. Write a note on the following :

(a) RAFT polymerization (b) ATRP polymerization.

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APRIL -2021 SEMESTER EXAMINATIONS
III SEMESTER – M.Sc., MATHEMATICS

Paper Code : **17PGE3C** Title of the paper : **Elective - Number Theory and Cryptography**

Date : **21.06.2021 AN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. Convert 10^6 to the base 7.
2. Define Euler phi function.
3. Define Legendre Symbol.
4. State Euclidian algorithm.
5. Define Legendre symbol.
6. Define cryptosystem.
7. Define generator of a finite field.
8. Write short note on Digraph transformation.
9. Write down Diffie-Hellman assumptions.
10. State the super increasing knapsack problem.
11. Define Pseudoprimes.
12. Explain general Knapsack problem.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Express 7 as a combination of 1547 and 560.
14. State and prove Fermat Little theorem.
15. Prove that the the order of any $a \in F_q^*$ divides $q-1$.
16. Explain EIGamal cryptosystem.
17. Solve the following systems of simultaneous congruences:

$$2x + 3y \equiv 1 mod 26$$

$$7x + 8y \equiv 2 mod 26.$$

18. Find the Discrete log of 28 to the base 2 in F^*_{37} using the Silver-Pohlig-Hellman algorithm (2 is the generator of F^*_{37}).
19. If $n \equiv 3 \bmod 4$, then *n* is a strong pseudoprime to the base *b* if and only if it is an Euler psuedoprime to the base *b*.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Prove that $\sum_{d/n} \varphi(d) = n$.
21. Show that $G^2 = (-1)^{\frac{q-1}{2}} q$.
22. Find the inverse of $A = \begin{pmatrix} 2 & 3 \\ 7 & 8 \end{pmatrix} \in M_2(Z/26Z)$.
23. How to finding algorithms for discrete logs in finite fields? Explain.
24. Let n be an odd composite integer.
    (a) If *n* is divisible by a perfect square > 1, then prove that *n* is not a Carmichael number.
    (b) If *n* is square free, then prove that *n* is a Carmichael number if and only if $\frac{p-1}{n-1}$ for every prime *p* dividing *n* .

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APRIL - 2021 SEMESTER EXAMINATIONS
IV SEMESTER – M.Sc., MATHEMATICS

Paper Code : **17PGE4C** Title of the Paper : **Elective - Stochastic Process**

Date : **08.05.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. State the specification of stochastic process.
2. Define Markov process.
3. Write down the classifications of one dimensional process.
4. Define Markov Chain and transition probability matrix.
5. Define 'Stationary distribution' of a Markov chain.
6. State the postulates for Poisson process.
7. Explain any two postulates for Poisson Process.
8. Define purely random Poisson process.
9. State Chapman-Kolmogorov equation.
10. A person enlists subscriptions to a magazine, the number enlisted being given by a Poisson process with mean rate 6 per day. Subscribers may subscribe for 1 or 2 years independently of one another with respective probabilities $\frac{2}{3}$ and $\frac{1}{3}$.Find the mean and variance of total commission earned in period t.
11. Define renewal process.
12. Write the integral equation of renewal theory.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. If X is a nonnegative random variable and for any a>0, then prove that $P_r(X \geq a) \leq \frac{E(X)}{a}$.
14. If $\{Z_i, i = 1, 2, 3, ...\}$ be a sequence of i.i.d random variables with $E\{Z_i\} = 1$ and $X_n = \prod_{i=1}^{n} Z_i$. Prove that $\{X_n, n \geq 1\}$ is a martingale.
15. State and prove Ergodic theorem for a finite irreducible chains.
16. Prove that $\{X_n, n \geq 0\}$ be a Markov chain having state space $S = \{1, 2, 3, 4\}$ and transition matrix

$$P = \begin{pmatrix} \frac{1}{3} & \frac{2}{3} & 0 & 0 \\ 1 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$$ is ergodic.

17. Obtain the equations of the birth and death process.

18. Derive Erlang's formula.

19.Prove that, the distribution of N(t) is given by $P_n(t)=P_r\{N(t)=n\}=F_n(t)-F_{n+1}(t)$ and the expected number of renewals by $M(t)=\sum_{n=1}^{\infty} F_n(t)$.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Show that the process $\{X(t), t\epsilon T\}$ is non-stationary, whose probability distribution is

given by $P\{X(t) = n\} = \begin{pmatrix} \frac{(at).^{n-1}}{(1+at).^{n+1}} & n = 1,2,3,\ldots \\ \frac{(at)}{(1+at)}, & n = 0 \end{pmatrix}$.

21. Show that, the state j is persistent iff $\sum_{n=0}^{\infty} p^{(n)}_{jj}=\infty$.

22. Prove that, the p.g.f of a non homogeneous process $\{N(t),t\geq 0\}$ is given by $Q(s,t)=\exp\{m(t)(s-1)\}$ where $m(t) = \int_0^t \lambda(x)dx$ is the expectation of N(t).

23. Discuss Erlang distribution.

24. State and prove Elementary Renewal Theorem.

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APRIL - 2021 SEMESTER EXAMINATIONS
IV SEMESTER – M.Sc., MATHEMATICS

Paper Code : **17PGE4D** Title of the Paper : **Elective - Fuzzy Sets and its applications**

Date : **21.06.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. Consider the set $E=\{x_1,x_2,x_3,x_4,x_5\}$ and the two subsets $A=\{(x_1,0),(x_2,1),(x_3,1),(x_4,0),(x_5,1)\}$, $B=\{(x_1,1),(x_2,0),(x_3,1),(x_4,0),(x_5,1)\}$. Find $A\cap B$ *and* $A\cup B$.

2. If

$$\underset{\sim}{A}=\begin{array}{ccccccc} x_1 & x_2 & x_3 & x_4 & x_5 & x_6 & x_7 \\ \hline 0.7 & 0.2 & 0.9 & 1 & 0 & 0.4 & 1 \end{array}$$

,find $\underset{\sim}{A}\cdot\overline{\underset{\sim}{A}}$.

3. Define a Fuzzy graph.
4. Define the complement of a relation and hence find the same for

$\underset{\sim}{\mathcal{R}}$	y_1	y_2	y_3	y_4
x_1	0,3	0,4	0,2	0
x_2	0,5	0	1	0,9
x_3	0,4	0	0,1	0,8

5. When do you call a relation to be antisymmetric?
6. Write the min-max transitivity property.
7. Define a maximal monomial.
8. If $D_{\underset{\sim}{a}}=[0.6,0.9)$ and $D_{\underset{\sim}{b}}=[0.2,0.7)$, find $D_{\underset{\sim}{a}\wedge\underset{\sim}{b}}$, $D_{\underset{\sim}{a}\vee\underset{\sim}{b}}$.
9. Define a law of internal composition.
10. Define a fuzzy submonoid.
11. If $E=\{x_1,\ x_2\}$ and $M=\left\{0,\ \frac{1}{2},\ 1\right\}$, then find the power set of E.
12. Prove that $\overline{\underset{\sim}{a}\wedge\underset{\sim}{b}}=\overline{\underset{\sim}{a}}\vee\overline{\underset{\sim}{b}}$.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Find the value of (i) $d(\underset{\sim}{A},\underset{\sim}{B})$ (ii) $\delta(\underset{\sim}{A},\underset{\sim}{B})$ (iii) $e^2(\underset{\sim}{A},\underset{\sim}{B})$ (iv) $\varepsilon(\underset{\sim}{A},\underset{\sim}{B})$ for

$$\underset{\sim}{A}=\begin{array}{ccccccc} x_1 & x_2 & x_3 & x_4 & x_5 & x_6 & x_7 \\ \hline 0,7 & 0,2 & 0 & 0,6 & 0,5 & 1 & 0 \end{array} \quad \text{and} \quad \underset{\sim}{B}=\begin{array}{ccccccc} x_1 & x_2 & x_3 & x_4 & x_5 & x_6 & x_7 \\ \hline 0,2 & 0 & 0 & 0,6 & 0,8 & 0,4 & 1 \end{array}$$

14. Consider the relation $\underset{\sim}{R}$, given by

$\underset{\sim}{R}$	A	B	C
A	0.8	1	0.1
B	0	0.4	0
C	0.3	0	0.2

Calculate $\hat{R}$.

15. (a) State and prove the theorem of decomposition for a similitude relation.

(b) If $\underset{\sim}{\mathcal{R}}$ is transitive and reflexive, then prove that $\underset{\sim}{\mathcal{R}}^k = \underset{\sim}{\mathcal{R}}$, $k = 1, 2, 3, \ldots$

16. If $D_{\underset{\sim}{a}} = [a_1, a_2)$ and $D_{\underset{\sim}{b}} = [b_1, b_2)$, find the domain of $\underset{\sim}{f}(\underset{\sim}{a}, \underset{\sim}{b}) = \hat{\underset{\sim}{a}} \wedge \underset{\sim}{b}$.

17. Construct a groupoid for the law $\underset{\sim}{A} * \underset{\sim}{B} = \underset{\sim}{A} \cap \underset{\sim}{B}$ with $E = \{A, B\}$ and $M = \left\{0, \frac{1}{2}, 1\right\}$.

18. For the following fuzzy graph, find the first projection, the second projection and the global projection.

$\underset{\sim}{R}$	y_1	y_2	y_3	y_4
x_1	0.1	0.2	1	0.3
x_2	0.6	0.8	0	0.1
x_3	0	1	0.3	0.6
x_4	0.8	0.1	1	0
x_5	0.9	0.7	0	0.5
x_6	0.9	0	0.3	0.7

19. Write short notes on the Gaussian fuzzy integers.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Let $p_i, m_i, n_i \in R^+$ $, i = 1, 2, \ldots, k$. Prove that $(p_i \le m_i + n_i, i = 1, 2, \ldots, k) \Rightarrow \sqrt{\sum_{i=1}^{k} p_i^2} \le \sqrt{\sum_{i=1}^{k} m_i^2} + \sqrt{\sum_{i=1}^{k} n_i^2}$.

21. Find the Max-min composition of $\underset{\sim}{\mathcal{R}}_1$ and $\underset{\sim}{\mathcal{R}}_2$ for the following relations

$\underset{\sim}{\mathcal{R}}_1$	y_1	y_2	y_3	y_4	y_5
x_1	0,1	0,2	0	1	0,7
x_2	0,3	0,5	0	0,2	1
x_3	0,8	0	1	0,4	0,3

$\underset{\sim}{\mathcal{R}}_2$	z_1	z_2	z_3	z_4
y_1	0,9	0	0,3	0,4
y_2	0,2	1	0,8	0
y_3	0,8	0	0,7	1
y_4	0,4	0,2	0,3	0
y_5	0	1	0	0,8

22. Let $\underset{\sim}{R} \subset E \times E$ be a similitude relation. Let x, y, z be three elements of E. If $c = \mu_{\underset{\sim}{R}}(x, z) = \mu_{\underset{\sim}{R}}(z, x)$, $a = \mu_{\underset{\sim}{R}}(x, y) = \mu_{\underset{\sim}{R}}(y, x)$, $b = \mu_{\underset{\sim}{R}}(y, z) = \mu_{\underset{\sim}{R}}(z, y)$, prove that $c \ge a = b$ or $a \ge b = c$ or $b \ge c = a$.

23. If $\underset{\sim}{f}(\underset{\sim}{a}, \underset{\sim}{b}, \underset{\sim}{c}) = (\bar{\underset{\sim}{a}} \wedge \bar{\underset{\sim}{b}}) \vee (\underset{\sim}{a} \wedge \underset{\sim}{b} \wedge \bar{\underset{\sim}{c}})$, then solve by the method of marinos that under what condition does the function of fuzzy variable satisfies $\alpha_{k-1} \le \underset{\sim}{f}(\underset{\sim}{a}, \underset{\sim}{b}, \underset{\sim}{c}) < \alpha_k$?

24. Give the table representing the fuzzy groupoid such that $E = \{A, B\}$, $M = \left\{0, \frac{1}{2}, 1\right\}$. Prove that

$\mu_{\underset{\sim}{A} \cap \underset{\sim}{B}}(x) = \mu_{\underset{\sim}{A}}(x) \wedge \mu_{\underset{\sim}{B}}(x)$.

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APRIL 2021 SEMESTER EXAMINATIONS

II SEMESTER – M.Sc., CHEMISTRY

Paper Code : **20PE2ED** Title of the Paper : **Extra Disciplinary Course - Herbal Botany**

DATE **: 28.06.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer any **TEN** Questions from the following

1. Homoeopathy
2. Choornam
3. Decoction
4. Home garden
5. Fenu Greek
6. *Curcuma longa*
7. *Coleus*
8. Ginseng
9. Almond
10. Kashayam
11. Nutrients in Dates
12. *Aloe*

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. Give an account on the importance of Herbal products.
14. Write concise account on Herbal Gardens.
15. List down the applications of Sandal wood in Cosmetic industry.
16. Mention the applications of *Myristica* and *Terminali*a in Pharmaceutical industry.
17. Give an account on the role of *Centella* as Nutraceutical product.
18. Discuss on the different formulations used in traditional medicine.
19. Give an account on types of plants used for Gardening.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. Give a detailed account on indigenous sytems of medicine
21. Explain different methods involved in the processing of plant products.
22. Write an essay on the role of herbs in Cosmetic industry.
23. Explain with suitable example the application of drugs derived from leaves and roots of plants in pharmacy.
24. Explain the nutraceutical importance of Amla and Nannari.

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APRIL 2021 SEMESTER EXAMINATIONS

II SEMESTER – M.Sc., CHEMISTRY

Paper Code : **20PEE2A** Title of the Paper : **Nano and Polymer Materials**

DATE **: 26.06.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer any **TEN** Questions from the following

1. Define carbon nanotubes.
2. What are called quantum dots?
3. List out any four applications of biosensors.
4. Expand: SPM and STEM.
5. TEM is superior than SEM. Justify.
6. Write the principle of AFM.
7. Mention any two advantages of Dip-pen Nanolithography.
8. What do you mean by Crystallinity of polymers.
9. Differentiate elastomer and fibres.
10. Give any two applications of fire retardant polymer.
11. Write the preparation of PVC.
12. Name any two biomedical polymers.

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. Why do you need stabliziers in the synthesis of Gold nano particles?
14. Write note on biosensors.
15. Explain the principle and working of STM.
16. What is the size range for nanomaterialsUuer confocal microscopy? Explain in detail.
17. Define Glass transition temperature. Explain the factors affecting it.
18. Write a note on fibre spinning.
19. Write the preparation and properties of polyamides.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. What are the various methods are employed in the preparation of nanomaterials? Explain any four methods of nanomaterials preparation in detail. (2+8 Marks)
21. Explain principle, working and advantages of STEM. (2+4+4 Marks)
22. Explain principle and working of AFM. (4+6 Marks)
23. Explain any two methods of moulding of polymers with a neat diagram. (5+5 Marks)
24. Describe the preparation, properties and uses of Phenol-formaldehyde. (4+4+2 Marks)

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APRIL 2021 SEMESTER EXAMINATIONS

II SEMESTER – M.Sc., CHEMISTRY

Paper Code : **20PEM2A** Title of the Paper : **Inorganic Chemistry – II**

DATE **: 23.06.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer any **TEN** Questions from the following

1. What is Chelation?
2. Write on Spectrochemical series.
3. What are Cross reactions?
4. Mention the limitations of CFT.
5. Give example for Labile and inert complexes.
6. What is the role of the bridging ligand with ISET reaction?
7. What is Trans effect?
8. What are Anation reactions?
9. What is Reppe's catalyst?
10. Write the general principles of catalysts.
11. What is Nephlauxetic effect?
12. Write the general rate law of A,D and I mechanism.

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. Write a note on the factors affecting stability of Complexes.
14. Explain Jahn Teller distortion.
15. Discuss different types of ligand substitution reactions.
16. Explain the synthesis of isomers in Pt(II) complexes.
17. Explain the Wacker's process of oxidation of olefins to aldehydes and ketones.
18. Write a note on sigma and pi bonding in octahedral complexes.
19. Comment on the role of Organo metallic compounds in catalysis.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. Explain the applications of ORD and CD in the identification of complexes.
21. (a) Compare CFT and MOT of bonding octahedral complexes.
    (b) Give evidences for M-L overlap.
22. Explain : (i) Marcus Hush theory (ii) Tunneling transfer.
23. Discuss the theories of Trans effect and applications of Trans effect in synthesis of cobalt Complexes.
24. Write on : (i) Cyclo-oligomerisation of acetylene using Ni catalyst.
    (ii) Hydroformylation reactions by OXO process.

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APRIL 2021 SEMESTER EXAMINATIONS

II SEMESTER – M.Sc., CHEMISTRY

Paper Code : **20PEM2B** Title of the Paper : **Organic Chemistry – II**

DATE **: 24.06.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer any **TEN** Questions from the following

1. What is Robinson annulation?
2. Give an example for Ozonolysis reaction.
3. What is Knoevenagal reaction?
4. Write about Mannich reaction.
5. Differentiate Hoffman and Saytzeff's elimination.
6. What are Chugev reactions?
7. What is Dieckmann cyclisation?
8. Mention the product of Mitsunobu reaction.
9. What happens when Cr is oxidized with PCC?
10. What happens when Li/NH_3 is used in reduction?
11. What is Michael addition?
12. Mention the use of oppenauer oxidation.

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. Write on the hydroxylation of olefinic double bonds using OsO_4 and $KMnO_4$.
14. Explain Corey's procedure of Asymmetric reduction of carbonyl functions.
15. Discuss the elimination of cyclohexane ring system.
16. Write a note on :
    (i) Ramberg - Backlund reactions. (ii) Von - Richter rearrangement
17. Explain the following :
    (i) MPV reduction (ii) Reduction reactions using DIBAL-H and $NaBH_4$
18. Discuss Eschenmoser-Tanabe rearrangement with an example.
19. Write a note on pyrolysis of esters.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. Explain the Electrophilic addition of carbon-carbon double bond with examples.
21. Describe the following :
    (i) Stobe condensation (ii) Darzen's Glysidic ester condensation (iii) Julia olefination
22. Explain Hoffmann degradation and pyrolysis of esters with example.
23. Describe the mechanism of : (i) Dienone - Phenol rearrangement
    (ii) Sommlet - Hauser rearrangement
24. Explain the Oxidation reactions involving :
    (i) SeO_2 (ii) DMP reagent (iii) MnO_2

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APRIL 2021 SEMESTER EXAMINATIONS

II SEMESTER – M.Sc., CHEMISTRY

Paper Code : **20PEM2C** Title of the Paper : **Physical Chemistry – II**

DATE **: 25.06.2021 FN** Time : **3 Hours** Maximum Marks : **75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer any **TEN** Questions from the following

1. What do you mean by rate of reaction and specific reaction rate?
2. Write the advantages of transition state theory over collision theory.
3. Define Collision number.
4. The relaxation time for the fast reaction $A \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} B$ is 10 micro second and equilibrium constant is 1.0×10^{-3}.
   Calculate the rate constants for the forward and the reverse reactions.
5. Write the equation for radiolysis of water.
6. How adsorption differs from absorption?
7. Write the help of a diagram explain the working of a catalyst.
8. List out the limitations of classical mechanics.
9. Show that the function Ae^{-ax} is an eigen function of the operator d^2/dx^2. What is Eigen value?
10. What are operators?
11. Why is ground state hydrogen stable?
12. Define Slater orbitals.

PART – B (5 X 5 = 25 Marks)

Answer any **FIVE** Questions from the following

13. Derive the Arrhenius equation and discuss how it is useful to calculate the energy of activation.
14. Using the Rice - Herzfeld mechanism for the reaction H_2+Br_2------>2HBr,employ steady state approximation for [H] and [Br], derive the rate law expression for the formation HBr.
15. Write a note on Flash photolysis.
16. With a neat diagram, explain adsorption isotherms of Langmuir and BET equation.
17. How does the study of particle in three dimensional box lead to the concept of degeneracy ?
18. Calculate the probability of finding the particle between 0.49a and 0.51a for the states ψ_1 and ψ_2.
19. Write a brief note on Born - oppenheimer approximation.

PART – C (3 X 10 = 30 Marks)

Answer any **THREE** Questions from the following

20. Derive the kinetics of i) Opposing reaction ii) Consecutive reactions.
21. Derive an expression for the influence of ionic strength on the rates of ionic reactions.
22. Explain the mechanism and kinetics of Michaelis - Menton equation for enzyme catalysis reactions.
23. What is the concept of a particle in a one dimensional box? What is Schrodinger Wave equation in such a case? How can this equation be solved for ψ and E?
24. By applying HMO theory predict the planarity for conjugated π systems of butadiene and benzene.

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